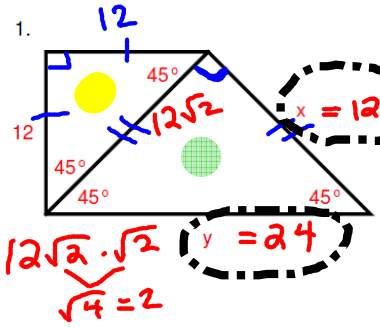
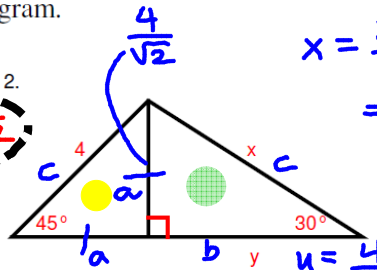
Worksheet 6.3: Special Right Triangles

Find the values of x and y in each diagram.

1.



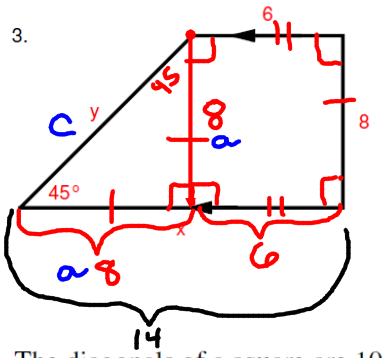
2.



$x = \frac{2}{1}\cdot\frac{4}{\sqrt{2}} = \frac{8}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}} = \frac{8\sqrt{2}}{\sqrt{4}} = \frac{8\sqrt{2}}{2} = 4\sqrt{2}$

$y = \frac{4}{\sqrt{2}}\cdot\sqrt{3} = \frac{4\sqrt{3}}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}} = \frac{4\sqrt{6}}{\sqrt{4}} = \frac{4\sqrt{6}}{2} = 2\sqrt{6}$

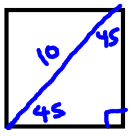
3.



x = 14

$y = 8\sqrt{2}$

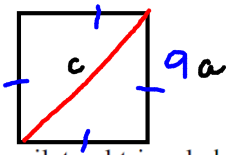
4. The diagonals of a square are 10 units long. Find the length of a side of the square.



$a = \frac{c}{\sqrt{2}} = \frac{10}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}} = \frac{10\sqrt{2}}{2} = 5\sqrt{2} \approx 7.07$

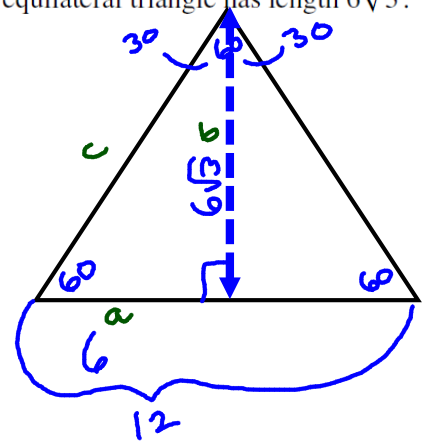
5. Find the length of a diagonal of a square whose perimeter is 36.

36/4 = 9



$c = 9\sqrt{2} \approx 12.73$

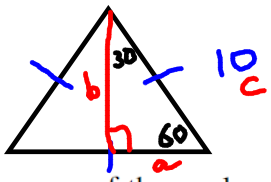
6. An altitude of an equilateral triangle has length $6\sqrt{3}$. What is the preimeter of the triangle.



$a = \frac{b}{\sqrt{3}} = \frac{6\sqrt{3}}{\sqrt{3}} = 6$

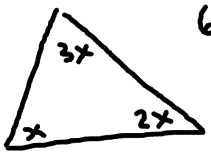
perimeter = 36

7. Find the altitude of an equilateral triangle if each side is 10 units long.



$b = \frac{c\sqrt{3}}{2} = \frac{10\sqrt{3}}{2} = 5\sqrt{3}$

8. If the measures of the angles of a triangle are in the ratio 1 : 2 : 3, are the lengths of the sides in the same ratio?

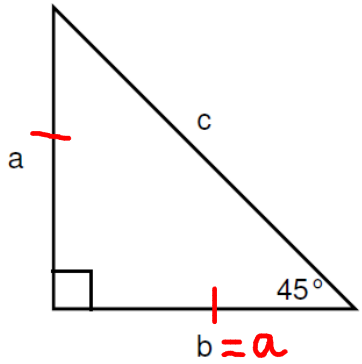


$6x = 180$
$x = 30$
$2x = 60$
$3x = 90$

no

$1 : \sqrt{3} : 2$
$a : b : c$

Use the figure below to complete the each exercise.



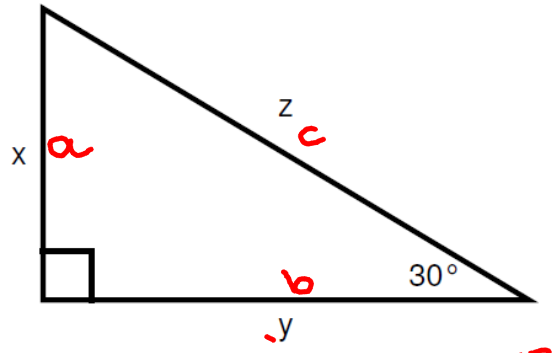
9. If a = 8, then c = $8\sqrt{2} \approx 11.31$.

10. If $b = 2\sqrt{3}$, then c = $2\sqrt{6} \approx 4.90$.

11. If $c = \sqrt{5}$, then a = $\frac{\sqrt{10}}{2} \approx 1.58$ $\frac{\sqrt{5}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{10}}{2}$.

12. If c = 12, then b = $6\sqrt{2} \approx 8.49$ $\frac{12}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{12\sqrt{2}}{2}$.

Use the figure below to complete each exercise.



13. If x = 10, then y = $10\sqrt{3} \approx 17.32$ and z = 20.

14. If y = 10, then x = $\frac{10}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{10\sqrt{3}}{3} \approx 8.66$ and z = $\frac{20\sqrt{3}}{3} \approx 11.54$.

$\sqrt{18} = \sqrt{2} \cdot \sqrt{9}$, $\sqrt{9} = 3$

2, 9, 3, 3

15. If z = 12, then x = 6 and y = $6\sqrt{3} \approx 11.39$.

16. If $z = 4\sqrt{6}$, then x = $2\sqrt{6} = 4.90$ and y = $6\sqrt{2} \approx 8.49$.

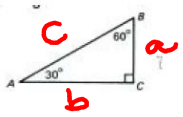
$2\sqrt{6} \cdot \sqrt{3} = 2\sqrt{18}$

$\sqrt{9}\sqrt{2}$

$= 2 \cdot 3 \cdot \sqrt{2}$

Special Right Triangles Worksheet

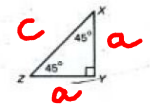
Exercises 1-6 refer to the 30-60-90 triangle. Using the given information, find the indicated length.



1. AB=14; BC= 7
2. BC=7; AB= 14
3. BC=8; AC= $8\sqrt{3} \approx 13.86$
4. AB=16; AC= $8\sqrt{3} \approx 13.86$
5. AC=$9\sqrt{3}$; BC= 9
6. AC=$4\sqrt{3}$; AB= 8

$\frac{9\sqrt{3}}{\sqrt{3}}$ $\frac{4\sqrt{3}}{\sqrt{3}} = 4$ $4 \cdot 2 = 8$

Exercises 7-12 refer to the 45-45-90 triangle. Using the given information, find the indicated length.

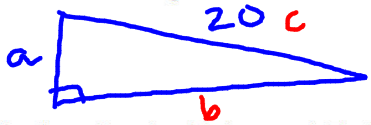


7. XY=7; XZ= $7\sqrt{2} \approx 9.90$
8. YZ=10; XZ= $10\sqrt{2} \approx 14.14$
9. XZ=$11\sqrt{2}$; YZ= 11
10. XZ=10 ; XY= $5\sqrt{2} \approx 7.07$
11. YZ=$7\sqrt{2}$; XZ= 14
12. XZ=12; YZ= $6\sqrt{2} \approx 8.49$

$\frac{10}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{10\sqrt{2}}{2}$ $7\sqrt{2} \cdot \sqrt{2} = 7 \cdot 2 = 14$ $\frac{12}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{12\sqrt{2}}{2}$

13. The length of the hypotenuse of a 30-60-90 triangle is 20. What is the length of the shorter leg?

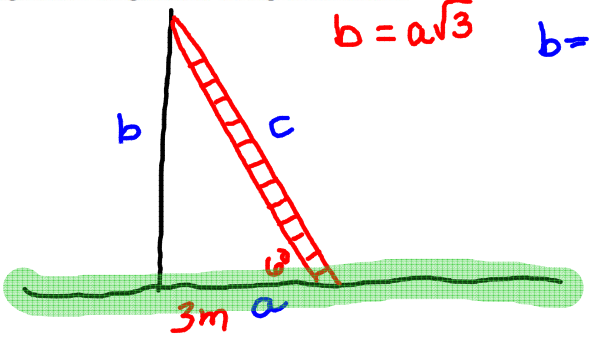
$a = \frac{c}{2}$



$a = 10$

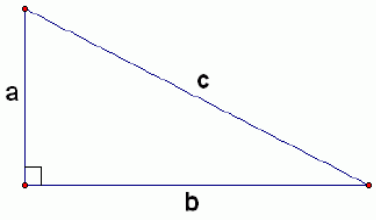
14. A ladder leaning against a wall makes a 60 angle with the ground. The base of the ladder is 3 m from the building. How high above the ground is the top of the ladder?

$b = a\sqrt{3}$ $b = 3\sqrt{3}$



Triangle Area – May 11 Name:

Use this triangle as a model for questions 1-7.



$a^2 + b^2 = c^2$

1) a= 10, c=20, b= 17.32 Area= 86.6

$100 + b^2 = 400 \quad b^2 = 300$

2) a=3, b=5, c= 5.9 , Area= 7.5

$9 + 25 = c^2 \quad c^2 = 34$

3) a= 10, c=18, b= 14.9, Area= 74.85

$100 + b^2 = 324 \quad b^2 = 224$

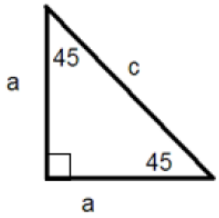
4) b=12, c=17, a= 12.04, Area= 72.24

$a^2 + 144 = 289 \quad a^2 = 145$

5) a= 4, b=8, c= 8.99, Area= 16

$16 + 64 = c^2 \quad 80 = c^2$

Use this triangle as a model for 8-12.



a=c/√2

c=a√2

8) a= 10, c=$10\sqrt{2}$ 14.14, Area= 50

9) c= 12√2, a=12, Area= 72

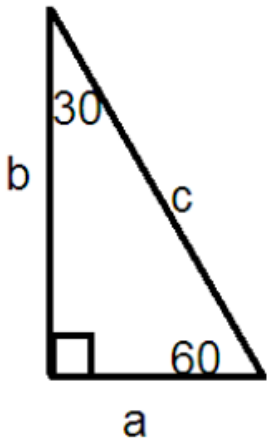
10) a=5, c=$5\sqrt{2}$ 7.01, Area= 12.5

11) c=40√2, a=40, Area= 800

12) c=10, a= 7.07, Area = 24.9

$$\frac{10}{\sqrt{2}} = 7.07$$

Use this triangle for 13-20.



c= 2a c=2b/√3

a=c/2 a= b/√3

b=a√3 b=c√3/2

13) a= 10, b= $10\sqrt{3}$, c= 20 , Area= $\frac{1}{2}(10)(10\sqrt{3}) = 50\sqrt{3} \approx 86.6$

14) b=12√3, a= 12 , c= 24 , Area= $\frac{1}{2} \cdot 12 \cdot 12\sqrt{3} = 72\sqrt{3} \approx 124.71$

15) c=40, a= 20 , b= $20\sqrt{3} \approx 34.64$, Area= 346.4

16) a=4, b= $4\sqrt{3} \approx 6.9$, c= 8 , Area= 13.8

17) c=8, a= 4 , b= $4\sqrt{3} \approx 6.9$, Area= 13.8

18) b=5, a= $\frac{5}{\sqrt{3}} \approx 2.89$, c= $\frac{10}{\sqrt{3}} \approx 5.77$, Area= 7.23

19) a=14, b= $14\sqrt{3} \approx 24.25$, c= 28 , Area= 339.48

20) c=44, a= 22 , b= $22\sqrt{3} \approx 38.10$, Area= 419.16